

Aktuelle Veranstaltungen

Kolloquium

- Thema:** [Verleihung der Ehrendoktorwürde an Herrn Prof. Dr. Krzysztof Redlich](#)
- Datum:** 25.11.19
- Uhrzeit:** 16:15
- Ort:** ZiF Plenarsaal
- Vortragender:** Prof. Dr. Johanna Stachel (Heidelberg) und Prof. Dr. Helmut Satz (Bielefeld)

Inhalt:

Ansprechpartner: [Dekan](#)

Kolloquium Mathematische Physik

- Thema:** [Thimble regularisation of quantum field theories](#)
- Datum:** 29.11.19
- Uhrzeit:** 16:15
- Ort:** V3-201
- Vortragender:** [Francesco di Renzo](#)

Università di Parma

Lattice regularisation provides an effective framework for a non-perturbative definition of Quantum Field Theories. It also enables numerical computations: in the euclidean formulation, lattice QFT resembles a statistical physics problem, the functional integral defines a decent probability measure and Monte Carlo simulations are viable. Nevertheless, this is not always the case. When a complex action is in place, we have no probability measure to start with and there is no obvious way to set up a Monte Carlo scheme. This is known as the sign problem. Among other theories, QCD with a chemical potential is plagued by a sign problem and we have no effective way to tackle the investigation of its (supposedly rich) phase diagram. A few years ago a conceptually simple technique was proposed to tame (or at least mitigate) the sign problem. The idea is to choose an alternative domain of integration within a complexified extension of the path integral. Most noticeably, there is a perfect candidate for such an alternative domain of integration: Lefschetz thimbles. These manifolds are characterised by a constant imaginary part of the action and the only residual sign problem is the one tied to the integration measure. Thimble regularisation is not only worth investigating to look for a decent Monte Carlo scheme; it is stimulating per se, and as a matter of fact the first attempts at a thimble formulation of QFT did not have computational applications as a goal. I will present an introduction to the technique, trying to highlight the conceptual challenges we have to face. In particular, I will discuss the problems that arise when we stumble into so-called Stokes phenomena and when we try to define a thimble formulation for gauge theories.

Inhalt:

Ansprechpartner: [S. Schlichting](#)

Seminar Hochenergiephysik

Thema: [Black hole thermodynamics in the extended phase space](#)

Datum: 05.12.19

Uhrzeit: 14:15

Ort: D6-135

Vortragender: [Nan LI](#)

Northeastern University, Shenyang, China

Inhalt:

In this talk, we first review the so-called black hole thermodynamics in the "extended phase space", in which the cosmological constant is interpreted as a varying thermodynamic pressure, and the black hole mass is identified with its enthalpy rather than internal energy. Moreover, a thermodynamic volume can be introduced for a black hole space-time. In this framework, the equation of state of a black hole resembles that of the non-ideal fluid (e.g., the van der Waals equation), and a black hole can show

abundant phase transition behaviors accordingly. Some applications, such as the Hawking-Page phase transition and the throttling process (Joule-Thomson effect), will be discussed in more detail.

Ansprechpartner: [D. Schwarz](#)

Seminar Kondensierte Materie

Thema: [Topologically protected Landau level in the vortex lattice of a Weyl superconductor](#)

Datum: 14.11.19

Uhrzeit: 16:00

Ort: D5-153

Vortragender: Carlo Beenakker

Instituut-Lorentz, Leiden University

Inhalt: Good ideas in science may be rejected for a while, but they have a tendency to return when the time is right. This has happened with a 20-year old conjecture that certain superconductors in a magnetic field would support a field-independent flat-band in the middle of the gap. After Gorkov, Schrieffer, and Anderson proposed this idea of a superconducting Landau level, it was dismissed because it does not survive the broadening effects of the magnetic vortex lattice in a superconductor. We have discovered a way around this, by populating the Landau levels with Weyl fermions rather than with conventional electrons. Weyl fermions come in a left-handed and in a right-handed variety and a Landau level contains only one of these two chiralities. The Landau level is protected from broadening by the vortex lattice because that needs to mix both chiralities in order to be effective. If this new twist on an old idea is borne out by experiments on Weyl superconductors, it would finally allow for quantum Hall physics to enter the superconducting domain. For example, the superconducting Landau level would have a quantized heat conductance parallel to the magnetic field.

Ansprechpartner: [Gernot Akemann](#)

Seminar Mathematische Physik

[Critical behaviour and characteristic polynomials of non-Hermitian](#)

Thema: [random matrices](#)

Datum: 23.05.19

Uhrzeit: 16:15

Ort: D5-153

Vortragender: [Nicholas Simm](#)

University of Sussex

Inhalt: I will discuss some recent developments regarding the normal matrix model. In particular my interest will be in certain critical models where the limiting support of the eigenvalues can radically change its topology by slightly adjusting an external parameter. I will discuss how aspects of the model can be explicitly mapped to the study of expectations of characteristic polynomials of non-Hermitian random matrices (e.g. Ginibre or truncated unitary). Many of these averages are related to Painlevé transcendents, and by exploiting this, a precise and non-trivial asymptotic expansion of partition functions can be calculated in the critical models. This is joint work with Alfredo Deaño (University of Kent).

Ansprechpartner: [Gernot Akemann](#)

Seminar AG Zufallsmatrizen

Thema: tba

Datum: 18.12.19

Uhrzeit: 16:15

Ort: V3-201

Vortragender: [Oleg Zaboronski](#)

University of Warwick

Inhalt:

Ansprechpartner: [Gernot Akemann](#)